

CLAIMS

1. A phasing element intended for inserting a variable lag in the transmission of an electric signal by variation of the electric path travelled by said signal in the phasing element,
5 characterised in that it includes:
- an input transmission line (2) and an output transmission line (3), said transmission lines (2, 3) being printed lines and being placed in order not to be coupled radioelectrically to one another, at the surface of a main printed circuit
10 (4),
- a mobile radioelectric coupling means (5) input (2) and output (3) transmission lines, said coupling means comprising a first (6) and a second arm (7),
- the electric path shows a variation range between a first position where
15 the first and second arm (6, 7) cover respectively and entirely the input and output transmission lines (2, 3) thereby defining a minimal electric path, and a second position where the first and second arm (6, 7) are respectively placed in the alignment of the input and output transmission lines (2, 3) thereby defining a maximal electric path.
- 20 2. A phasing element according to claim 1, characterised in that the phasing element (1) comprises an insulator (8) placed between each of said transmission lines (2, 3) and the arm (6, 7) corresponding to the mobile radioelectric coupling means (5).
- 25 3. A phasing element according to claim 1 or 2, characterised in that the mobile radioelectric coupling means (5) comprises a substrate having a surface whereon are placed the first and second arm (6, 7), said surface of the substrate comprising the first and second arm (6, 7) being placed opposite the surface of the main printed circuit (4).
- 30 4. A phasing element according to any of the claims 1 to 3, characterised in that the input and output transmission lines (2, 3) are parallel and the mobile radioelectric coupling means (5) comprises a substantially U-shaped coupling circuit.
- 35 5. A phasing element according to any of the claims 1 to 4, characterised in that the mobile radioelectric coupling means (5) is arranged on a plate of a phasing carriage (35).

6. An antenna having a radiation pattern exhibiting at least a main lobe axis defining a downtilt angle with respect to the earth's surface, said antenna (9) including an elongated support (15) having a longitudinal main axis, a front face (16) and a rear face (17), at least two radiating elements (18) placed along
5 the front face of the support (15) and at least one lobe formation circuit (19) arranged on the support (15) and including phase adjustment means (20) to modify downtilt angle,

characterised in that said phase adjustment means (20) include at least one phasing element (1) according to any of the claims 1 to 5.

10 7. An antenna according to claim 6, characterised in that the support (15) is a printed circuit whereof the front face is metallized, the lobe formation circuit (19) being placed on the rear face of the printed circuit.

8. An antenna according to claim 6 or 7, characterised in that each phase adjustment means (20) is connected to a single radiating element (18).

15 9. An antenna according to claim 8, characterised in that the phase adjustment means (20) include each a first phasing element (1), an input gate (25) and an output gate (26), said input gate (25) being formed of the input transmission line of the first phasing element and the output gate being formed of the output transmission line of the first phasing element, said input gate (25)
20 being connected to a feed line (27) and said output gate (26) being connected to the corresponding radiating element (18).

10. An antenna according to claim 9, characterised in that at least one phase adjustment means (20) comprises moreover a second phasing element (1), said first and second phasing elements (1) being connected in series by the
25 output transmission line of the first phasing element and the input transmission line of the second phasing element and in that the input gate (25) is formed of the input transmission line of the first phasing element (1) and the output gate (26) is then formed of the output transmission line of the second phasing element (1), said input gate (25) being connected to a feed line (27) and said
30 output gate (26) being connected to the corresponding radiating element (18).

11. An antenna according to claim 9 or 10, characterised in that the feed line (27) includes sections of different widths and is a printed line.

12. An antenna according to any of the claims 9 to 11, characterised in that at least two radiating elements (18) are connected to this feed (27).

13. An antenna according to any of the claims 6 to 12, characterised in that the phase adjustment means include displacement means (28) for moving each radioelectric coupling means (5) of each phasing element (1) and a means (29) for controlling the displacement means (28), the displacement means (28) of each radioelectric coupling means (5) of each phasing element and the control means (29) being laid out so that a displacement of the control means (29) along the longitudinal main axis of the support (15) induces, by dint of the displacement means (28), a displacement transversal relative to the longitudinal main axis of the support (15) of each mobile radioelectric coupling means (5).

14. An antenna according to claim 13, characterised in that the control means (29) comprises a first fixed plate (39), connected to the support opposite the rear face (17) of the support and spaced apart therefrom, and a second plate (40) installed in the first plate (39) slidingly along the longitudinal main axis of the support (15), said second plate (40) comprising means co-operating with the displacement means (28) of each mobile radioelectric coupling means (5) of each phasing element (1) for transversal displacement of each mobile radioelectric coupling means (5) when moving the second plate (40) along the longitudinal main axis of the support.

15. An antenna according to claim 14, characterised in that the second plate (40) includes at one of its ends an actuating rod (45) which can be connected to an actuating device.

16. An antenna according to claim 15, characterised in that the actuating device comprises an engine, and positioning means to determine the position of the rod, said positioning means transmitting position signals.

17. An antenna according to claim 16, characterised in that the actuating device comprises moreover an electronic management unit to process said position signals of the actuating rod, said electronic unit comprising an interface, with or without a wire, to receive operating instructions and/or transmit the position of the actuating rod (45).

18. An antenna according to any of the claims 6 to 17, characterised in that each displacement means (28) comprises guiding means (30) enabling to maintain the radioelectric coupling means against the printed circuit (21).

19. An antenna according to claim 18, characterised in that said guiding means (30) include a bottom (31) and side walls (32), said bottom (31)

comprising a recess (33) forming a guiding rail and means (34) to fix said guiding means (30) on the printed circuit (4, 15).

20. An antenna according to claim 19, characterised in that each displacement means (28) comprises a guiding stud (37) exhibiting at a first end
5 an extension connected to the radioelectric coupling means (5) and at the other end a nipple (38), engaged in a slanted slot (42) provided in the second mobile plate (40) of the control means (29).

21. An antenna according to any of the claims 6 to 20, characterised in that the antenna (9) comprises two lobe formation circuits (19) in order to
10 exhibit a radiation diagram comprising two lobes having different polarisations.

22. An antenna according to claim 21, characterised in that the radiating elements (18) are double polarisation radiating elements.